Filariasis

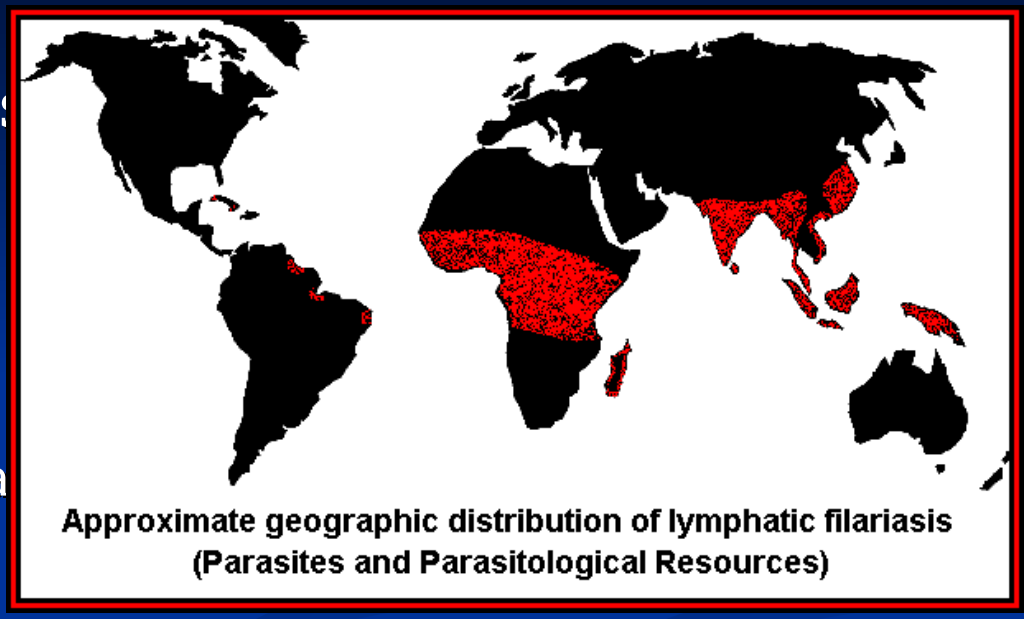
Lymphatic filariasis

- Lymphatic filarial worms
  - *Wuchereria bancrofti*
  - *Brugia malayi & timori*
- In tropical areas:

  SE Asia, India, Indonesia, China, South Pacific, Central America, Caribbean
- 120 million infected
- Vectored by various mosquitoes
- Show different periodicity
  - Larval stages (microfilaria) circulate in blood at

  different times, corresponding to times when

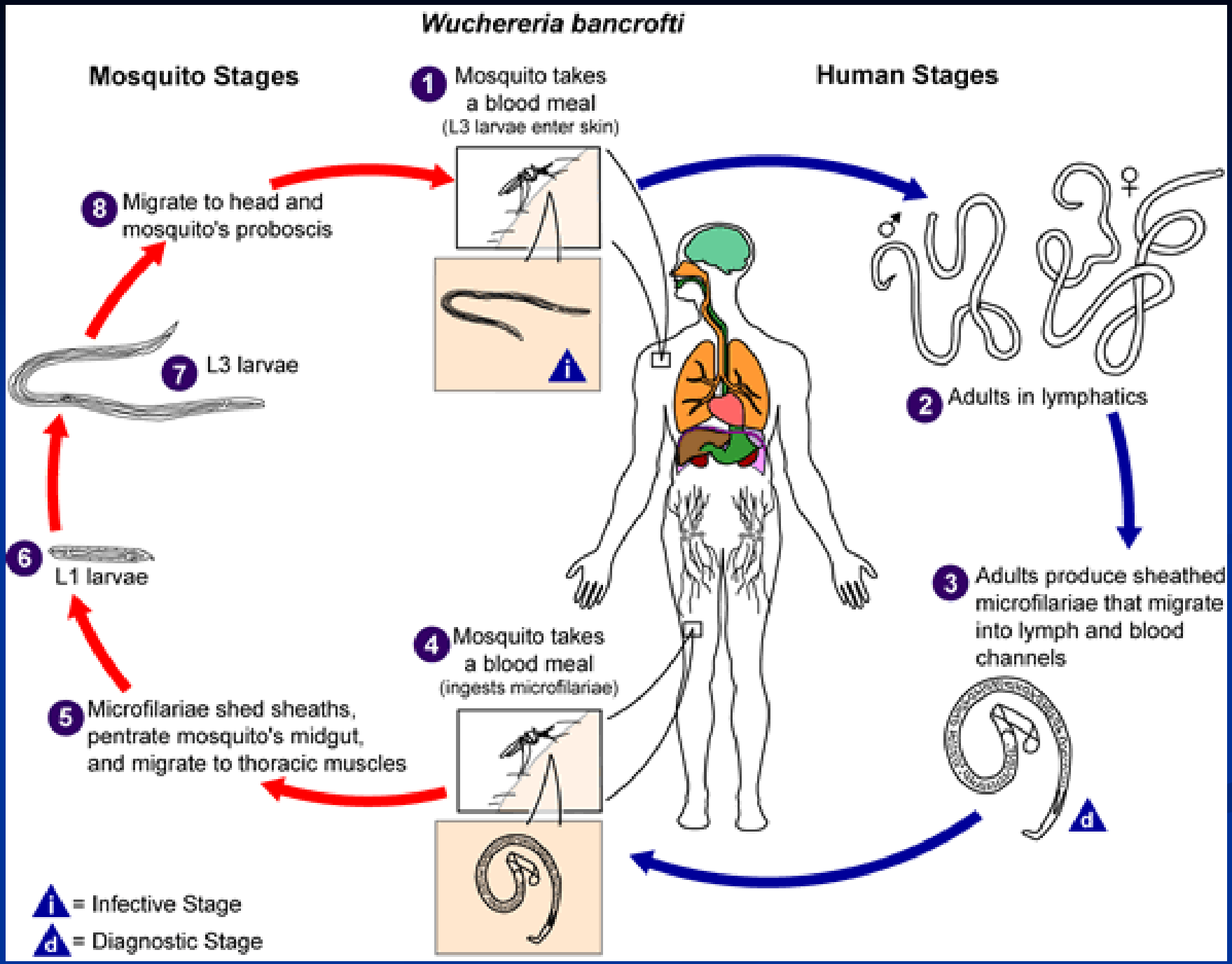
  vector feeds



Approximate geographic distribution of lymphatic filariasis
(Parasites and Parasitological Resources)

Generalized life cycle

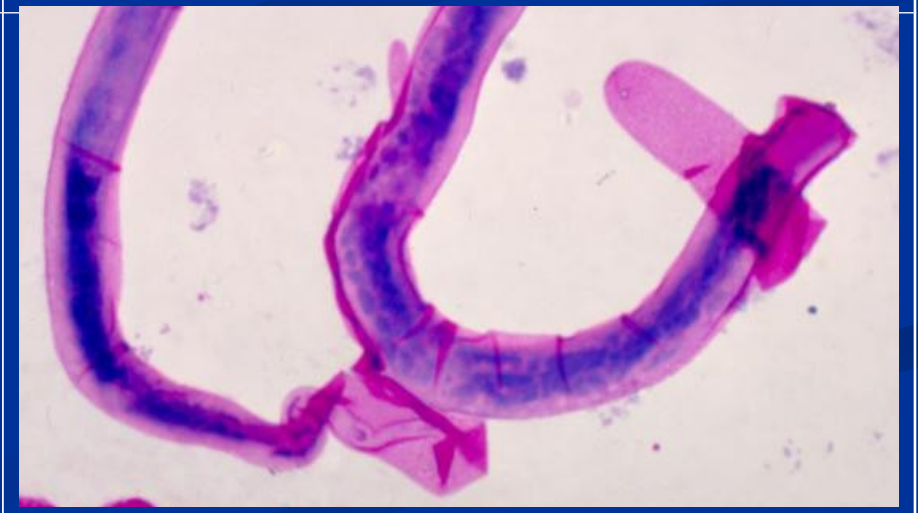
- 1st stage larvae (microfilaria=mf) circulating in blood of human ingested as mosquito takes blood meal
- Develop over 1-3wks in mosquito to infective 3rd stage larvae, deposited onto skin and enter blood stream
- Mature in lymphatics, mate, produce mff
- PP 6-12 months


Wuchereria bancrofti
Mosquito Stages
Human Stages
1 Mosquito takes a blood meal
(L3 larvae enter skin)
2 Adults in lymphatics
3 Adults produce sheathed microfilariae that migrate into lymph and blood channels
4 Mosquito takes a blood meal
(ingests microfilariae)
5 Microfilariae shed sheaths, pentrate mosquito's midgut, and migrate to thoracic muscles
6 L1 larvae
7 L3 larvae
8 Migrate to head and mosquito's proboscis
i = Infective Stage
d = Diagnostic Stage

Morphology

- Adults
  - Females 80-100 mm long, males half
  - White, threadlike, in lymphatics
  - Females bear live young (mff)
- Microfilaria
  - Sheathed
  - In blood

Lymphatic Microfilaria

Wuchereria bancrofti	*Brugia* spp
250-300 µm Pointed tail Nuclei stop short of tip Nuclei discrete, not smudged	175-230 µm Tapered tail w/nuclei to tip A constriction separates last 2 nuclei (subterminal & terminal) Sheath of *B. malayi* stains pink w/ Giemsa
	

Lymphatic Filariasis

- Initially asymptomatic until mechanical damage caused by highly motile adult worms in lymphatic channels induce an inflammatory response
- Inflammation leads to valve damage, flow inhibition, fibrosis, collateral channel development
- Bancroftian filariasis usually in inguinal, epitrochlear, axillary, testicular areas
- Brugian filariasis usually in inguinal or axillary area, affecting distal extremities
- Early disease
  - Retrograde lymphangitis, fever, chills, malaise for 3-15 days, occurring several times/year
  - Lymph node abscesses in brugian type
  - Can get marked eosinophilia (1000->2500 cu mm)

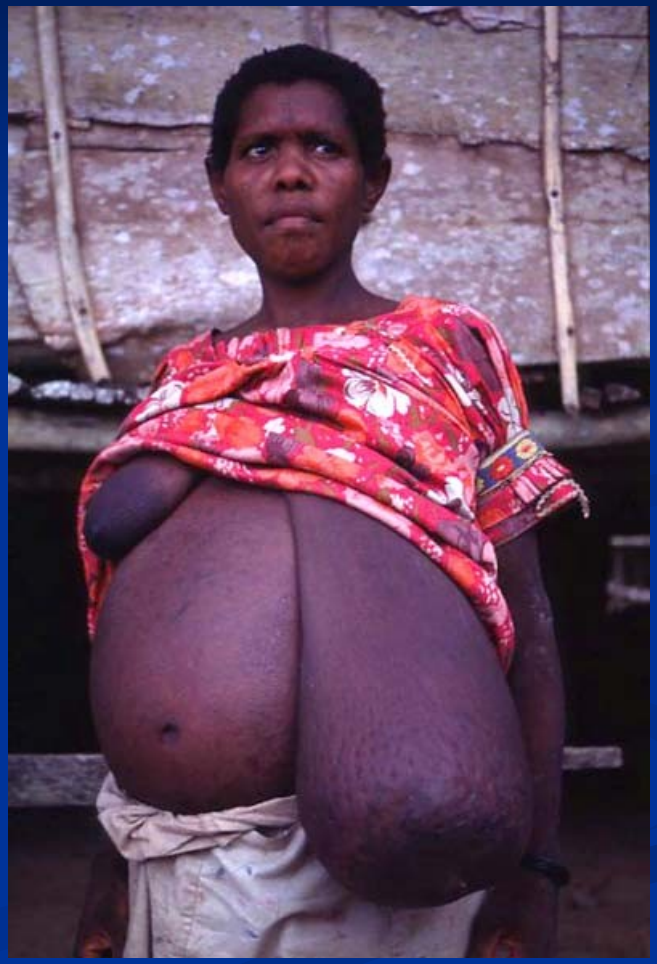
Tropical Pulmonary Eosinophilia

- Sequestration of mff in lungs, no microfilaremia
- Allergic response
- Recurring episodes of wheezing or nocturnal paroxysmal cough
- Persistent hypereosinophilia (>3000/ cu mm), high IgE levels, miliary lesions on xray
- Lasts for weeks
- Tx as for bancroftian filariasis

Chronic disease

- Prolonged infection leads to obstructive disease
- Chyluria w/ obstruction of renal lymphatics
- Hydrocoel most common complaint in genital area
- Lymphadema & elephantiasis most common in extremities (full leg w/ bancroftian, lower leg w/ brugian)

Lymphatic filariasis



Elephantiasis of Extremities

Diagnosis

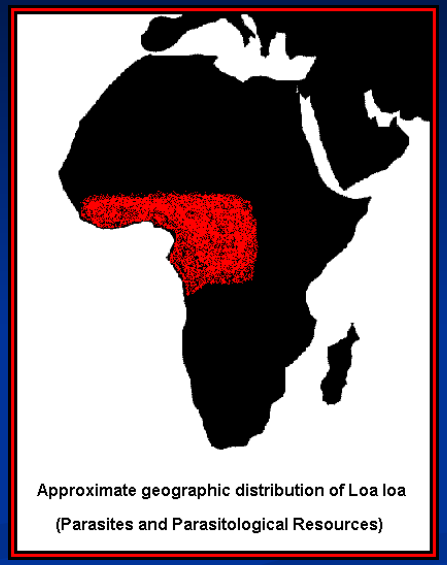
- Symptomatic: episodic lymphangitis, acute inflammation, irreversible lymphadema
- Visualization of mff in blood smears
  - Periodicity of microfilaremia must be considered
- Membrane filtration
- Knott technique
  - 1 ml blood into 9 ml 2% formalin, centrifuge, examine sediment
- A few rapid Ag detection tests available

Treatment

- Ivermectin (100-440 ug/kg x 1x; kids 200-400 ug/kg + albendazole 400 mg)
  - May need anti-inflammatory for allergic rxn caused by dying worms
- DEC (Diethylcarbamazine: Hetrazan, Banocide, etc)
  - 14 day regimen: Day 1 50 mg, Day 2 50mg tid, day 3 100 mg tid, days 4-14 2 mg/kg tid
- Eradication programs using DEC medicated salts or annual dosing programs
- Ivermectin & albendazole donated for control programs

African Eye Worm

- *Loa loa*
- Most common filarial infection in returning travelers from Africa
- Primarily West Africa
- 13 million infected in endemic area
- Vectored by tabanid flies of genus *Chrysops* (deer or red flies)

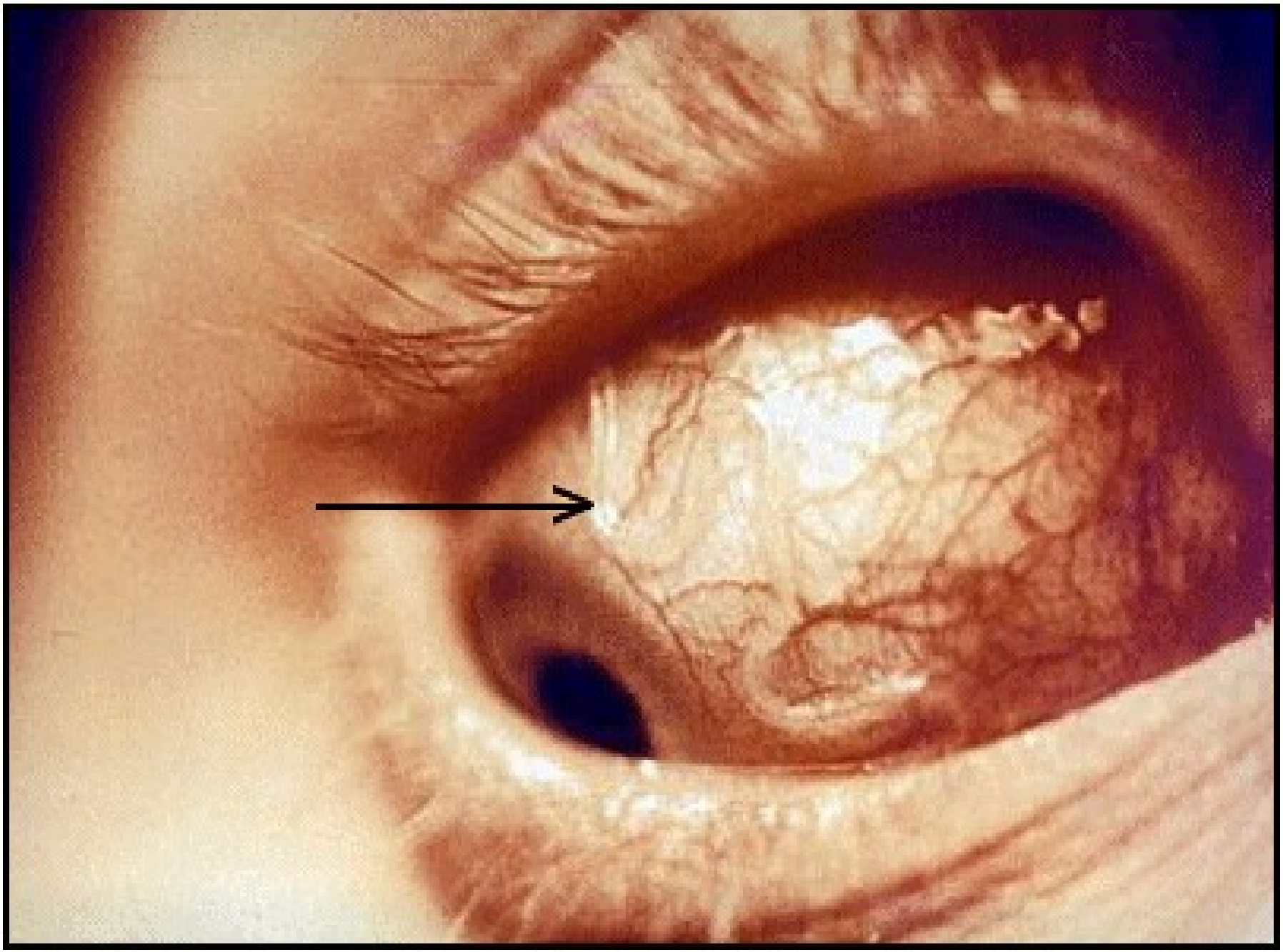


Approximate geographic distribution of Loa loa

(Parasites and Parasitological Resources)

Loiasis

- Adults migrate thru subQ tissue 1cm/min
- May move across eye, quite dramatic to patient
- Cause Calabar or fugitive swellings as they migrate
  - Allergic response
  - Transient, pruritic, painful
- Eosinophilia
- Do not produce migratory tracts like CLM or Strongyloides



Calabar swelling

Source: SCANTROPMED Tropical Disease Image Archive (McGill University Centre for Tropical Disease)

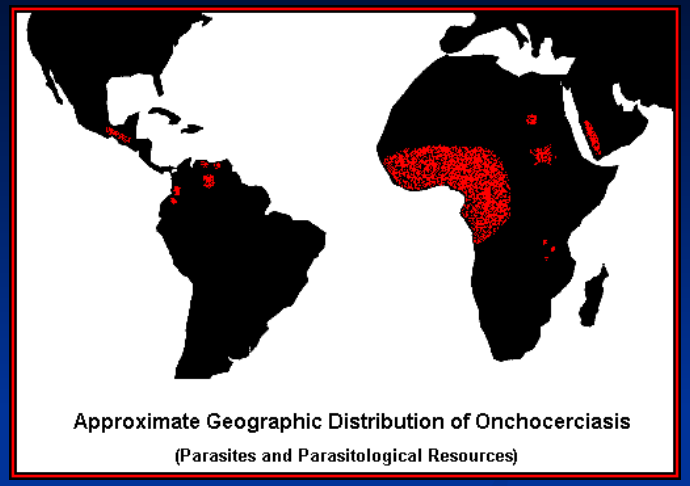
Loiasis Dx, Tx

- Microfilaria in blood smear
  - 250 um, sheathed, tail tapered with nuclei to tip
- Adult worm squirming across eye suggestive
- Tx with DEC
  - same as for lymphatic filariasis except days 4-14 use 3mg/kg tid
  - Prophylaxis DEC 300 mg/week

River Blindness

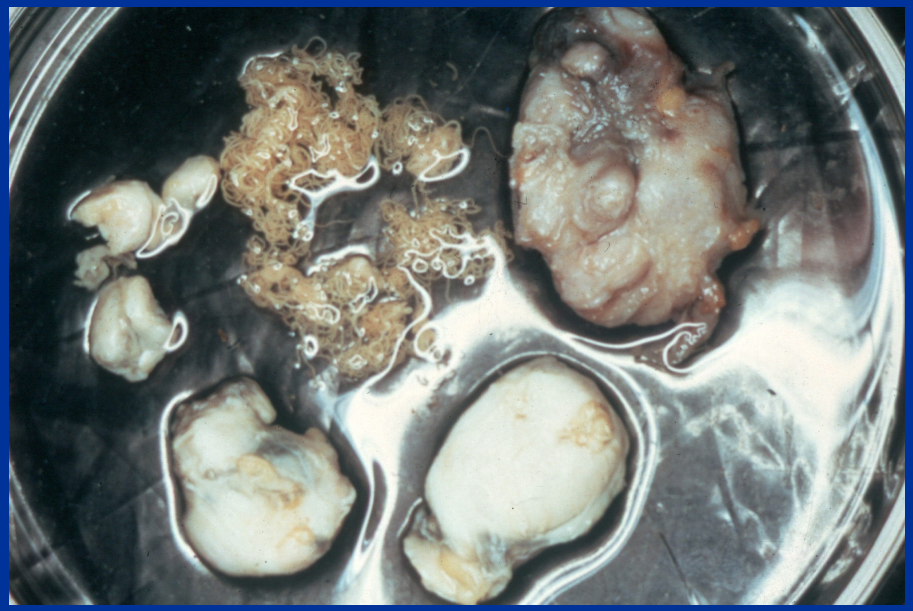
Onchocerciasis

- River blindness, sowda, Robles Disease
- Tropical Africa, parts of Middle East, Central & South America
- Transmitted by black flies of genus *Simulium*
  - Endemicity relates to closeness of housing to riverine habitat of black flies
- Sporadic to hyperendemic (70-100% infected)
- 20-50 million infected, in some areas 10% of population blinded
- Important socioeconomic problem in endemic areas



Biology

- Adults in subQ nodules release mff into skin, picked up by black flies during bloodmeals
- Females 230-500um, males 20-30um, coiled together in nodules called onchocercomas, form “loveknots”
- PP 3-15 months, adults live 10-15 years

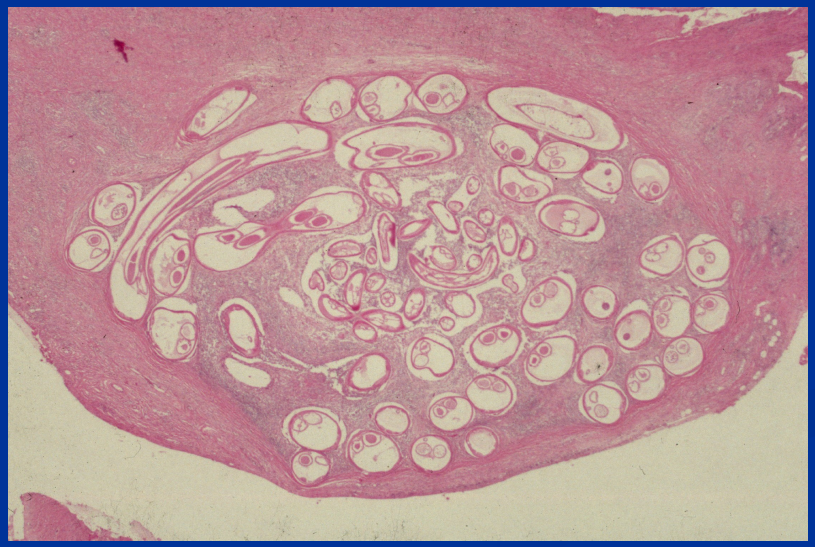


Microfilaria morphology

- 300-360 um
- Unsheathed
- Pointed tail devoid of nuclei
- In dermis and chambers of eye

Nodules

- Firm, round, easily moveable
- Contain several adults surrounded by fibrous capsule
- In African oncho, nodules tend to be found on the lower body while in American form, upper body is favored



Skin manifestations

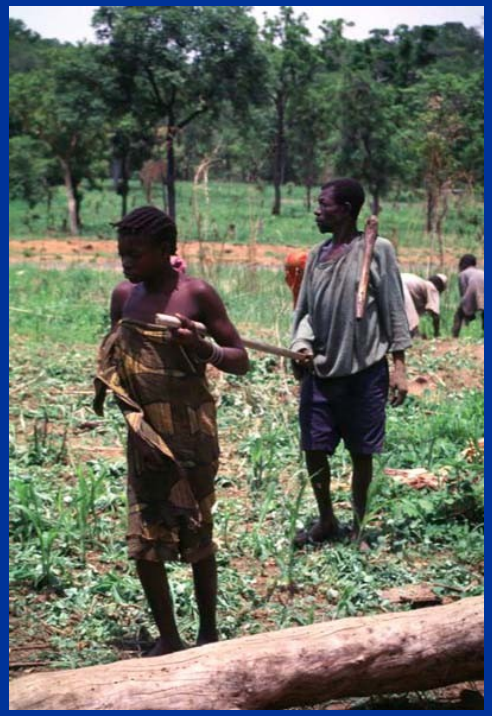
- Microfilarial death in upper dermis elicits inflammation, necrosis & edema
- Sowda
- Pigmentary changes (leopard skin)
- Fibrosis of dermal papillae
- Epithelial atrophy, fibrosis, decreased elastic fibers (elephant skin)

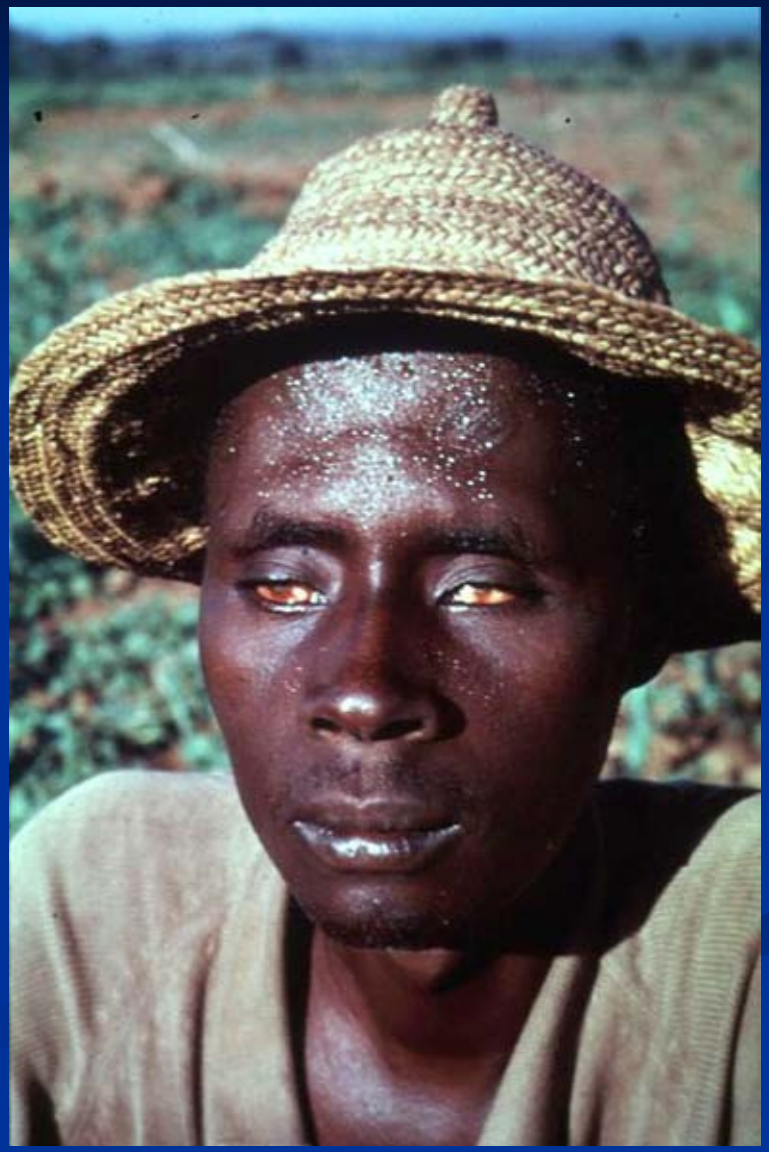
Hanging groin

- Atrophic inguinal or femoral lymph nodes that hang in a pouch of lymphadematous tissue

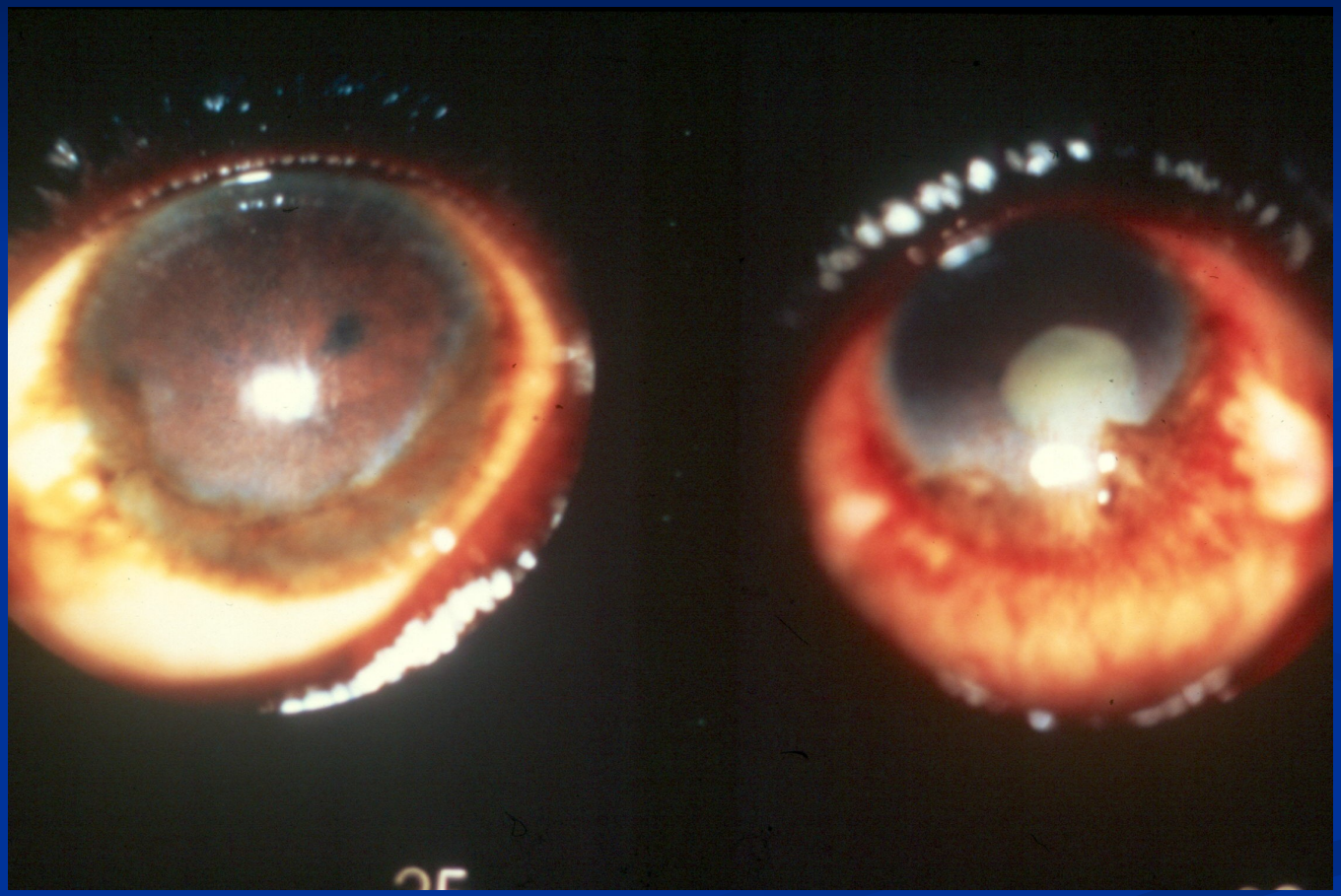
Ocular manifestations

- Punctate & sclerosing keratitis
- Anterior uveitis
- Chorioretinal scarring
- Disc atrophy and blindness





Sclerosing keratitis & glaucoma

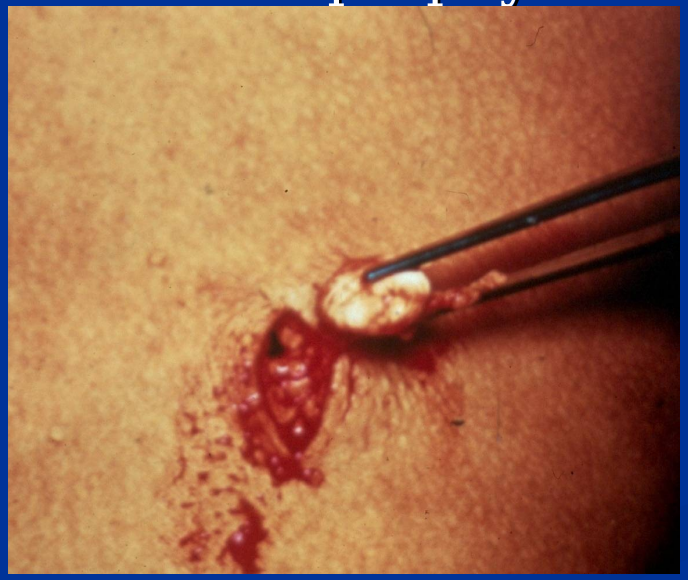


Diagnosis

- Skin snip from appropriate area
  - Soak in normal saline
  - Mff emerge in 30-60 minutes
- Slit lamp shows mff in cornea & anterior chamber
- Characteristic nodules
- DEC challenge
- 50 mg DEC cause inflammatory rxn to dying mff, hazardous with ocular oncho & loiasis
- Serology sensitive but not specific

Oncho Tx & Prevention

- Ivermectin is drug of choice
- 150 ug/kg once, repeated every 6-12 months until asymptomatic
- Denodulectomy campaigns
- Ivermectin prophylaxis

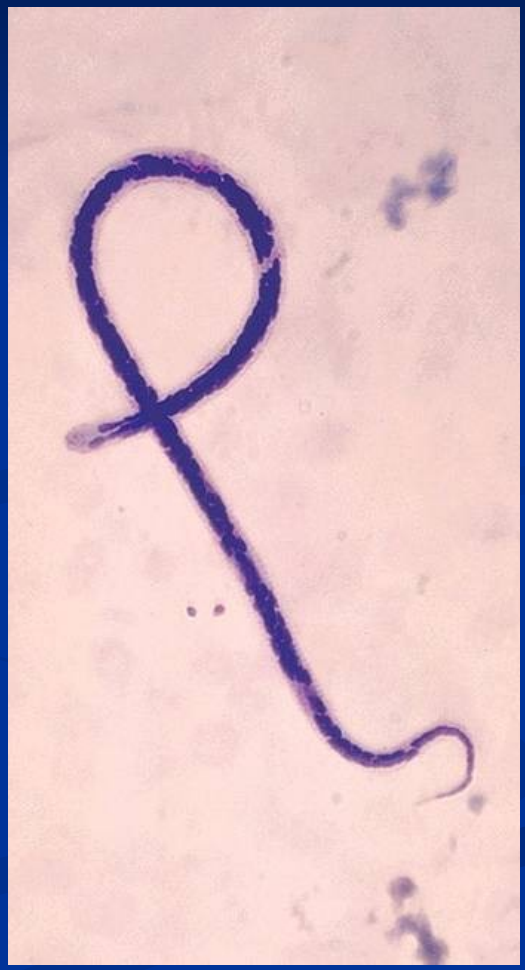


Minor filarial worms
Mansonella perstans

- Tropical Africa, Central & South America
- *Culicoides* vector
- Adults in body cavities, mff in blood
  - Mf unsheathed, 190-100 um, tail blunt w/nuclei to tip
- Usually asymptomatic but can have subQ swelling & abdominal pain
- Mebendazole 100 mg bid x 30 days

Minor filarial worms
Mansonella ozzardi

- Central & South American, Caribbean
- *Culicoides* vector
- Adults in body cavities, mff in blood
  - Mf unsheathed, 160-200 um, long slender tail w/ nuclei stopping short of end
- Usually asymptomatic, can have inguinal adenopathy
- Ivermectin 150 ug/kg



Minor filarial worms
Mansonella streptocerca

- Central & Western Africa
- Culicoides vector
- Adults in dermis, mff in skin
  - Mff unsheathed, 180-240 um, button-hook tail w/ nuclei to end
- Hypopigmented nodules, itching